

**Knife River Indian Villages
National Historic Site
Big Hidatsa FY04 Prescribed Fire Monitoring Report**

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Northern Great Plains Fire Effects Monitor*



Burn Unit Summary

The Big Hidatsa FY04 RX, which was completed during one operational period on 5/4/04, included 5 unconnected zones (Zone 1: **46 acres**; Zone 2: **16 acres**; Zone 3: **16 acres**; Zone 4: **20 acres** and Zone 5: **18 acres**) for a total of **116 acres**. Zone 1 had previously been burned as part of the Big Hidatsa burn unit -9/99. Zones 2, 3 & 4 burned as part of the Sakakawea prescribed fire – 10/01.

5/4/04

Size: 116 acres burned **Aspect:** predominately flat to slight terrain **Elevation:** 1670 - 1710 feet

Vegetation Type: predominantly non-native Smooth Brome (*Bromus inermis*)

Personnel:

Burn Boss: Dan Morford

Ignition Specialist: Steve Grater (SAGU Module); Rod Skalsky - trainee

Holding Specialist: Mark Smith

Fire Monitors: Bob Kobza (lead), Martha Jakobek - trainee

Engine Bosses: KNRI-Folk; THRO-Seitz; 2 SAGU Module engine bosses

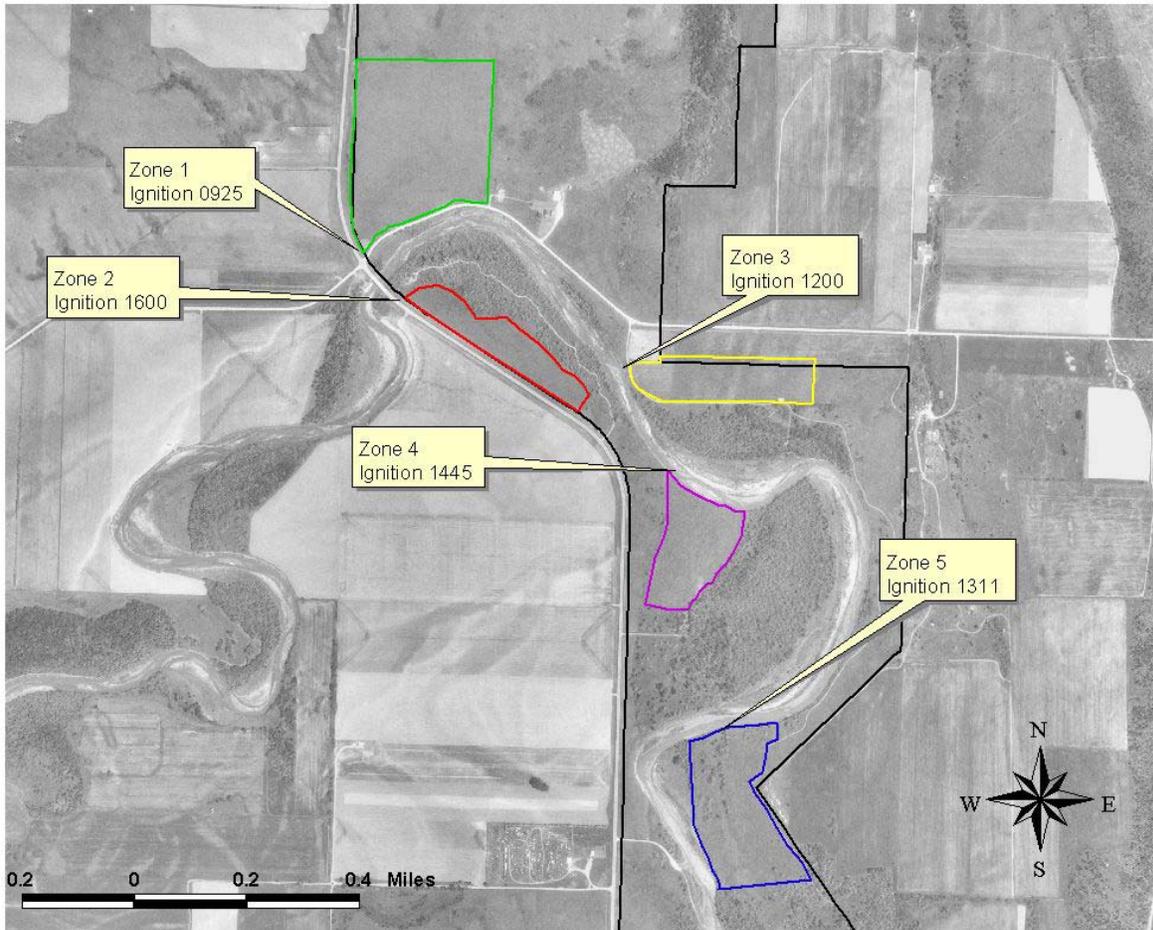
4 Type 6 Engines

2 ATV's

Objectives

Objectives of the Big Hidatsa 04 RX are as follows:

- Reduce 1-hr dead and down fuels in prairie by at least 75-85% immediate post-burn.
- Reduce standing live deciduous 100% immediate post burn.
- Decrease non-native herbaceous frequency and relative cover by at least 25% one-year post-burn.



Zone 1 - 46 acres

Weather Observations

5/4/04 Time	Temperature		Dew Point	RH	Wind		Comments
	Dry	Wet			Speed	Direction	
0700	45	39	31	58	1-3	N/NW	clear skies
0830	50	42	32	50	Calm	-	clear skies
0900	53	43	31	42	1-2	N/NW	clear skies
0945	55	45	34	44	2-4	N/NE	SW gusts/smoke shading affecting RH
1030	57	45	31	37	2-6	W	variable gusts
1055	58	45	29	33	2-4	Variable	clear skies

Fire Behavior Observations

Date	Time	Location	Fire Type	ROS	FL	Comments
5/4	0915	Test burn	B/F	2/3-4	6-12"	Brief wind switch caused head fire/less consumption
5/4	0935	Ignition point	F/H	2/12	2-3'	Smoke whirls
5/4	1005	West boundary	B	2	6-8"	Constant wind & behavior switches B/F/H
5/4	1045	West boundary	B/F	2/2	8-12"	Wavering H fire
5/4	1050	West boundary	H	7	20"	
5/4	1105	North boundary	H	2-3	18-24"	20' fire whirls

B=backing fire; F=flanking fire; H=head fire

ROS = rate of spread measured in chains per hour (1 chain = 66 feet or 20 meters)

Fire Progression

A test fire began at 0915 in the southwest corner of this 46 acre zone, and at 0925 igniters with drip torches set off along the south boundary, and 5 minutes later along the west boundary. Ignition Specialist Grater, on an ATV traveled between these lines igniting spots in 10-20 foot strips, also with a drip torch. Although winds were light, they were variable switching the fire along the south boundary from a flanking fire to a backing fire, and fire along the west boundary from a backing/flanking fire to, occasionally, a head fire. The igniter on the south side continued along the east boundary, then when three sides were complete, this igniter proceeded west, along the north boundary, while the igniter on the ATV brought a strip through the middle from south to north. Ignition was complete at 1110. Burning was complete at 1130.

Zone 3 - 16 acres

Weather Observations

5/4/04 Time	Temperature		Dew Point	Wind			Comments
	Dry	Wet		RH	Speed	Direction	
1145	60	45	26	27	1-2	SE	winds variable-switch (S)/increase (5-6)

Fire Behavior Observations

Date	Time	Location	Fire Type	ROS	FL	Comments
5/4	1210	wood pile/ West end	ignition			"V" formation
5/4	1210	North boundary	H	9	3'	fire whirls
5/4	1220	North boundary	B	2	6-12"	MEOF clumps not consumed
5/4	1220	North boundary	H	6	18-24'	
5/4	1220	South boundary	F/H	4/8	3'	wind switches
5/4	1240	South boundary	H	12	2-3'	wind switch - S

B=backing fire; F=flanking fire; H=head fire

ROS = rate of spread measured in chains per hour (1 chain = 66 feet or 20 meters)

Fire Progression

With winds now variable, but predominantly from the SE, this narrow, 16 acre burn was begun in the NW corner near the wood pile at 1200. Igniters with drip torches proceeded along the North, West and South boundaries, with the ATV adding strips about 5 feet in from the initial line. After about 15 minutes the ATV ran strips from West to East. Ignition was completed at 1240 by lighting the East side from North to South. Burning was complete at 1245.

Zone 5 - 18 acres

Weather Observations

5/4/04 Time	Temperature		Dew Point	RH	Wind		Comments
	Dry	Wet			Speed	Direction	
1300	65	48	28	25	4-7	S/SE	clear skies
1340	67	52	38	34	5-7	SE	river bottom effecting RH
1400	68	51	34	28	4-7	SE	clear skies

Fire Behavior Observations

Date	Time	Location	Fire Type	ROS	FL	Comments
5/4	1320	West boundary	B	1.5	6-12"	
5/4	1320	West boundary	F	4	6-12"	
5/4	1330	North boundary	F	-	12-18"	Effects better where BRIN was laid over
5/4	1350	South boundary	B	0.5	6-10"	
5/4	1350	South boundary	H	4	2-3"	
5/4	1405	SE corner	H	10	3-4'	

B=backing fire; F=flanking fire; H=head fire

ROS = rate of spread measured in chains per hour (1 chain = 66 feet or 20 meters)

Fire Progression

Winds continued from the S/SE, and the ignition of 18 acre Zone 5 began at 1311 in the NW corner. Igniters with drip torches then traveled South and East with the ATV adding a strip about 5-10 feet in. There were a few cottonwood trees scattered throughout this zone. When the South and East boundaries were blackened, the ATV laid a strip of fire into the wind just East of the main row of trees in the hope that fire would move through the trees without burning them. This met with some success, but a few trees were burned. While the lighters continued to blacken the perimeter, the ATV added strips into the wind, and spots in the interior. Ignition was complete at 1355 when the lighters reached the SE corner. Burning was complete at 1425.

Zone 4 - 20 acres

Weather Observations

5/4/04 Time	Temperature		Dew Point	RH	Wind		Comments
	Dry	Wet			Speed	Direction	
1430	70	52	34	27	6-7	S	high cirrus - 20%
1500	70	52	34	27	7-10	SE	high cirrus - 20%

Fire Behavior Observations

Date	Time	Location	Fire Type	ROS	FL	Comments
5/4	1500	NW boundary	H	5	2-3'	
5/4	1510	center strips/NW	B	4	8-10"	BRIN flags laid over with B fire
5/4	1510	center strips/NW	H	up to 12	3'	flags consumed
5/4	1520	center strips/SW	B	4	12-15"	
5/4	1520	South boundary	F	6	6-10"	

B=backing fire; F=flanking fire; H=head fire

ROS = rate of spread measured in chains per hour (1 chain = 66 feet or 20 meters)

Fire Progression

The ignition of Zone 4, 20 acres, began in the NW corner. The igniters, with drip torches, striped out this narrow corner before proceeding South and East along the boundaries, with 10’ strips being added as the edge was blackened. The ATV began lighting strips into the S/SE wind. Along these strips both head fire and backing fire was observed. Ignition was complete when the two teams tied in at the SE corner at 1525. Burning was complete at 1545.

Zone 2 - 16 acres

Weather Observations

5/4/04 Time	Temperature		Dew Point	RH	Wind		Comments
	Dry	Wet			Speed	Direction	
1555	70	50	27	20	4-8 G 10	S/SE	high cirrus – 10%
1655	72	52	31	22	8-11	S	

Fire Behavior Observations

Date	Time	Location	Fire Type	ROS	FL	Comments
5/4	1610	NE boundary	B	3	12-18”	BRIN
5/4	1610	NE boundary	H	18	2-3’	BRIN
5/4	1620	North boundary	F	3	6-12”	BRIN
5/4	1630	West boundary	H	12	12-18”	AGCR
5/4	1630	East boundary	B	3	6-12”	AGCR
5/4	1630	center strip	F	4	12”	AGCR

B=backing fire; F=flanking fire; H=head fire

ROS = rate of spread measured in chains per hour (1 chain = 66 feet or 20 meters)

Fire Progression

At 1600 the ignition of the 16 acre Zone 2 began. The winds continued to be from the S/SE, and as this narrow zone paralleled a NW stretch of County Road 37 there was concern that smoke might cause visibility problems for drivers. Igniters on foot began at the NW end and blackened the perimeter while the ATV added strips into the wind in the center. At 1645 the perimeter lighters tied in at the SE end, and burning was complete at 1700.

Biomass

Location/Type	Sample size	Fuel Loading	Average Fuel Loading
Zone 1- BRIN	3	3.16 tons per acre	2.62 tons per acre
Zone 2 - BRIN	3	2.83 tons per acre	
Zone 3 -BRIN	3	2.67 tons per acre	
Zone 4 -BRIN	3	2.12 tons per acre	
Zone 5 - BRIN	3	2.30 tons per acre	

Soil Samples

Location	Sample Size	Average Soil Moisture
Random	3	21.34%

Smoke Monitoring

With these 5 small burn zones, the primary fuel being grass, there was little impact from smoke. Winds were light and variable in the morning, and the column at the midpoint of Zone 1's ignition rose straight up approximately 1200 feet. The winds switched from North to S/SE in the afternoon, but remained light – only occasionally reaching 8-10 mph. On the firelines of each zone, as winds wavered, there were periods when visibility was reduced from fair or good to poor, but due to fluctuating winds and the size of the burns, this was always of short duration. Three of the zones were adjacent to County Road 37, but the smoke had little effect on roadway visibility.

Fire Monitoring

There were no fire monitoring plots located within the boundaries of the Big Hidatsa FY04 zones. Post burn observations of the severity were made in each zone immediately following the fire – looking specifically at the varying effects of backing, flanking and head fire on the vegetation and substrate.

The spread direction seemed to have little effect on consumption as almost 100% of the vegetation appeared to be “moderately burned” (usually less than 2 inches of stubble remaining). However, brief wind switches, which caused backing or flanking fires to become head fires, did show a distinct difference in consumption. In Zones 1 & 5 strips of green grass were visible in the black with head fire. In Zones 2 & 4, it was observed that head and flanking fire consumed the stems and seed heads of the Smooth brome, while backing fire burned only the bases, and laid the stems and seed heads over.



The spread direction had more effect on the substrate. Of samples measured:

- Backing : 92% were moderately burned; 8% lightly burned
- Flanking : 75% lightly burned; 25% moderately burned
- Head: 80% lightly burned; 19% moderately burned; 5% heavily burned

Conclusions

The burning of these 5 zones is the first step in a 3 step treatment program for 2004. Herbicide will be applied next, followed by reseeding. Monitoring plots may be added to these areas in the future to assess the effects of herbicide application and reseeding.



Mallard nest with 10 eggs in Zone 1